Housing Search in Massachusetts Supplemented by Foursquare Venue Data

IBM Applied Data Science Capstone, Coursera

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Introduction

- In the search for a new home it is easy to filter homes by things such as price, sq footage, or bedrooms using popular website such as Zillow, Realtor, or Redfin.

- However, that is only half the story. The neighborhood and the amenities around the house are also important.

- This project combines Redfin data with Foursquare data to satisfy house attributes as well as neighborhood amenity requirements.

Purpose

- Clients approached our real estate office to help with their property search. They need a larger house for a growing family but like the amenities in their neighborhood.

- They were spending a lot of time researching each neighborhood they found a suitable house for sale.

- Developing this code to help them as well as future clients with similar needs.

- Can be used as a marketing differentiator.

Requirements

House Requirements

- Max Price: $800,000
- Min Price: $649,000
- Max sqft: 3,500
- Min sqft: 2,000
- Min Beds: 3
- County: Essex, Massachusetts
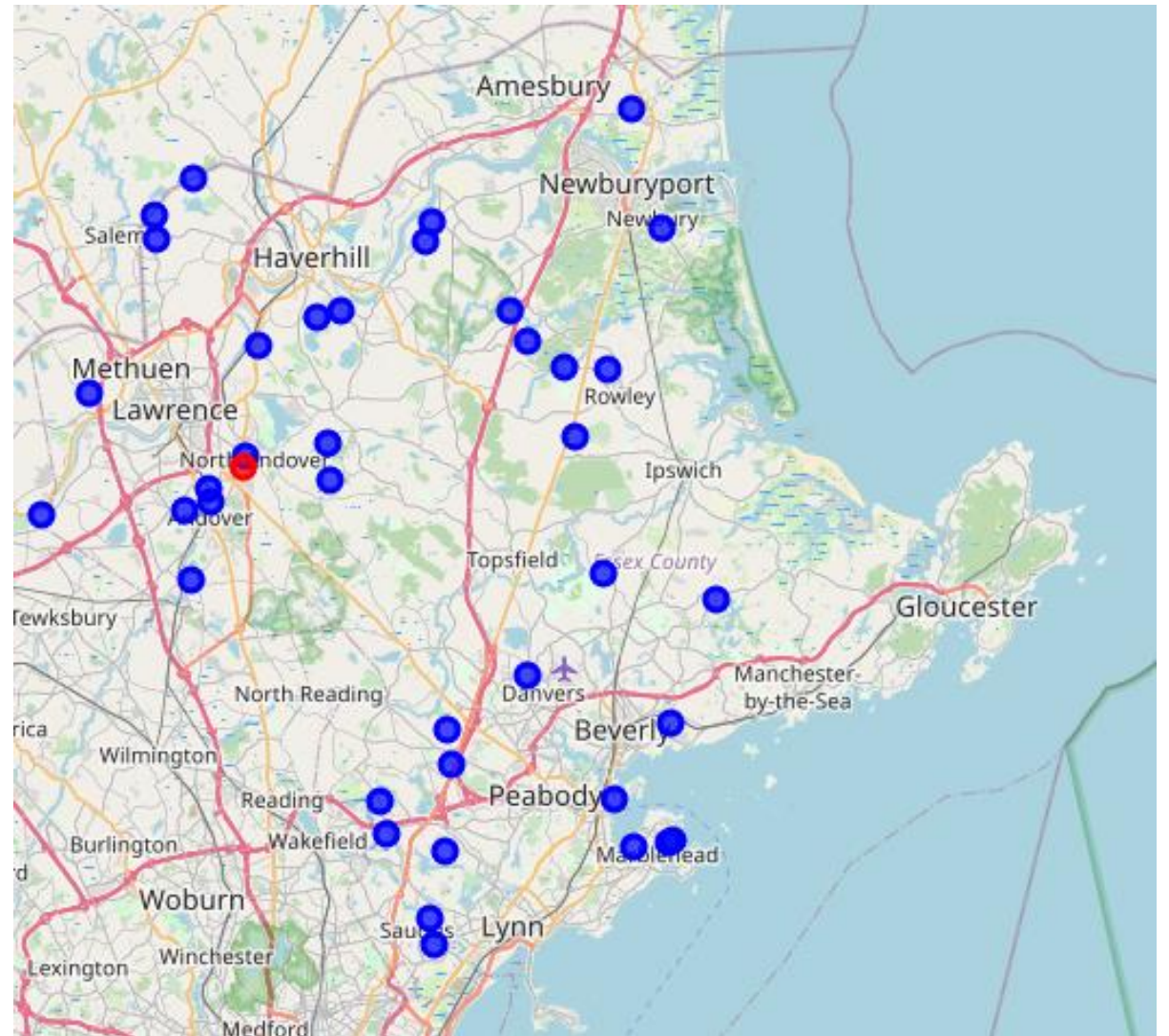- Single Family Home

Neighborhood Requirements

Amenity	Distance	Amenity	Distance
Park	0.5 miles	Train Station	2 miles
Grocery Store	2 miles	Golf Course	4 miles
Fire Station	2 miles	Emergency Room	5 miles
Police Station	2 miles		

Data

- Redfin API
  - Allows up to 350 houses to be returned in a CSV file based on requested criteria.

- Foursquare API
  - Many request options available, we will leverage the venue search function
  - Allows venues based on a specific category to be returned for a specific geolocation.

- Data will be processed using python code from within a Jupyter Notebook

Methodology

- Define current residence and geolocation
  - 201 Andover ST, N. Andover

- Retrieve Redfin data from API
  - Returned 39 properties
    - Red = Current Residence
    - Blue = For Sale Home

Sample of Returned Amenities

- This house at 107 Jericho Rd only met 4 of the 7 required amenities.
- It is not a suitable property per the requirements.

	Address	City	Venue_Name	Latitude	Longitude	Miles_Away	Type	Category_ID
0	107 Jericho Rd	Haverhill	AFC Urgent Care Methuen	42.748010	-71.129980	4.7	Emergency Room	4bf58dd8d48988d194941735
1	107 Jericho Rd	Haverhill	None	NaN	NaN	NaN	None	4bf58dd8d48988d12e941735
2	107 Jericho Rd	Haverhill	None	NaN	NaN	NaN	None	4bf58dd8d48988d163941735
3	107 Jericho Rd	Haverhill	atkinson fire station	42.839152	-71.151867	1.7	Fire Station	4bf58dd8d48988d12c941735
4	107 Jericho Rd	Haverhill	Atkinson Resort & Country Club	42.820483	-71.179901	1.5	Golf Course	4bf58dd8d48988d1e6941735
5	107 Jericho Rd	Haverhill	None	NaN	NaN	NaN	None	4bf58dd8d48988d118951735
6	107 Jericho Rd	Haverhill	NorEaster Amtrack Train 685	42.815300	-71.113312	2.0	Train	4bf58dd8d48988d129951735

Comparison to Current Residence

- Current residence meets all amenity requirements.
- However, as stated previously, the house is too small

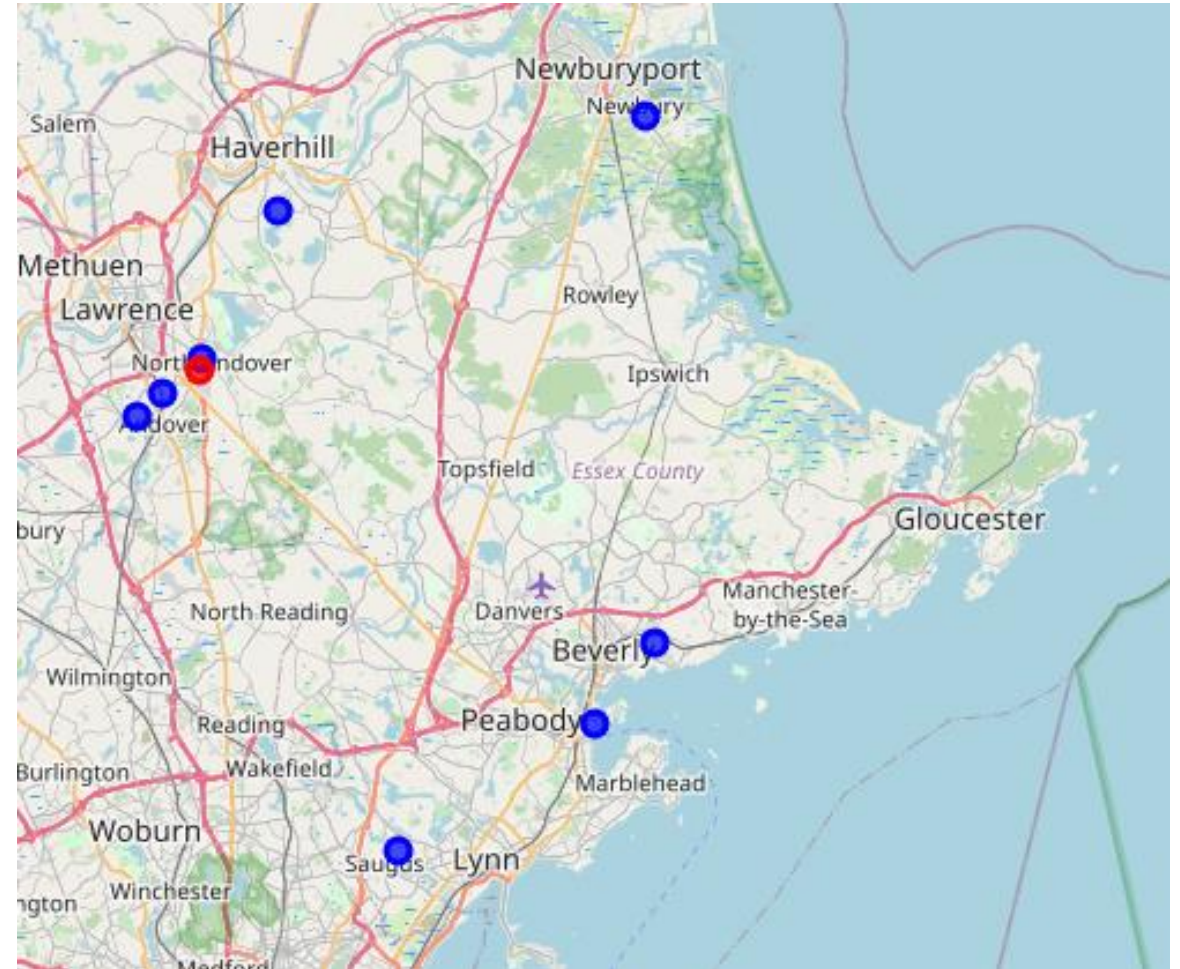|	Address	City	Venue_Name	Latitude	Longitude	Miles_Away	Type	Category_ID
0	201 Andover ST	North Andover	North Andover Town Common	42.684259	-71.115001	0.4	Park	4bf58dd8d48988d163941735
1	201 Andover ST	North Andover	Market Basket	42.684600	-71.136469	0.9	Grocery Store	4bf58dd8d48988d118951735
2	201 Andover ST	North Andover	North Andover Fire Department	42.682369	-71.110961	0.5	Fire Station	4bf58dd8d48988d12c941735
3	201 Andover ST	North Andover	North Andover Police Department	42.692820	-71.119249	0.9	Police Station	4bf58dd8d48988d12e941735
4	201 Andover ST	North Andover	MBTA Andover Station	42.659738	-71.144101	1.9	Train Station	4bf58dd8d48988d129951735
5	201 Andover ST	North Andover	Andover Country Club	42.672571	-71.167067	2.4	Golf Course	4bf58dd8d48988d1e6941735
6	201 Andover ST	North Andover	AFC Urgent Care North Andover	42.675541	-71.130661	0.6	Emergency Room	4bf58dd8d48988d194941735

Combine Redfin and Filtered Foursquare Data

- These are the 8 properties out of the original 39 which meet all client criteria.

	ADDRESS	CITY	STATE	ZIP	PRICE	BEDS	BATHS	LATITUDE	LONGITUDE	Total_Criteria_Met
0	9 Allison Cir	Haverhill	MA	1835	695000	4	2.5	42.749880	-71.073292	7
1	8 Rock O Dundee Rd	Andover	MA	1810	649000	3	1.5	42.669856	-71.141811	7
2	76 High Rd	Newbury	MA	1951	649900	3	2.0	42.790985	-70.855265	7
3	50 Cobblestone Cir	North Andover	MA	1845	739900	3	2.5	42.685932	-71.119205	7
4	37 Biscayne Ave	Saugus	MA	1906	649900	5	2.0	42.469664	-71.002022	7
5	2 Robin Rd	Beverly	MA	1915	799900	4	2.5	42.561573	-70.848841	7
6	19 Emerton St #19	Salem	MA	1970	684900	4	3.5	42.525309	-70.885780	7
7	119 Shawsheen Rd	Andover	MA	1810	799900	3	2.5	42.660239	-71.156665	7

Final Property List and Map

1. 9 Allison Cir, Haverhill

2. 18 Rock O Dundee Rd, Andover

3. 276 High Rd, Newbury

4. 350 Cobblestone Cir, N. Andover

5. 437 Biscayne Ave, Saugus

6. 52 Robin Rd, Beverly

7. 619 Emerton St #19, Salem

8. 7119 Shawsheen Rd, Andover
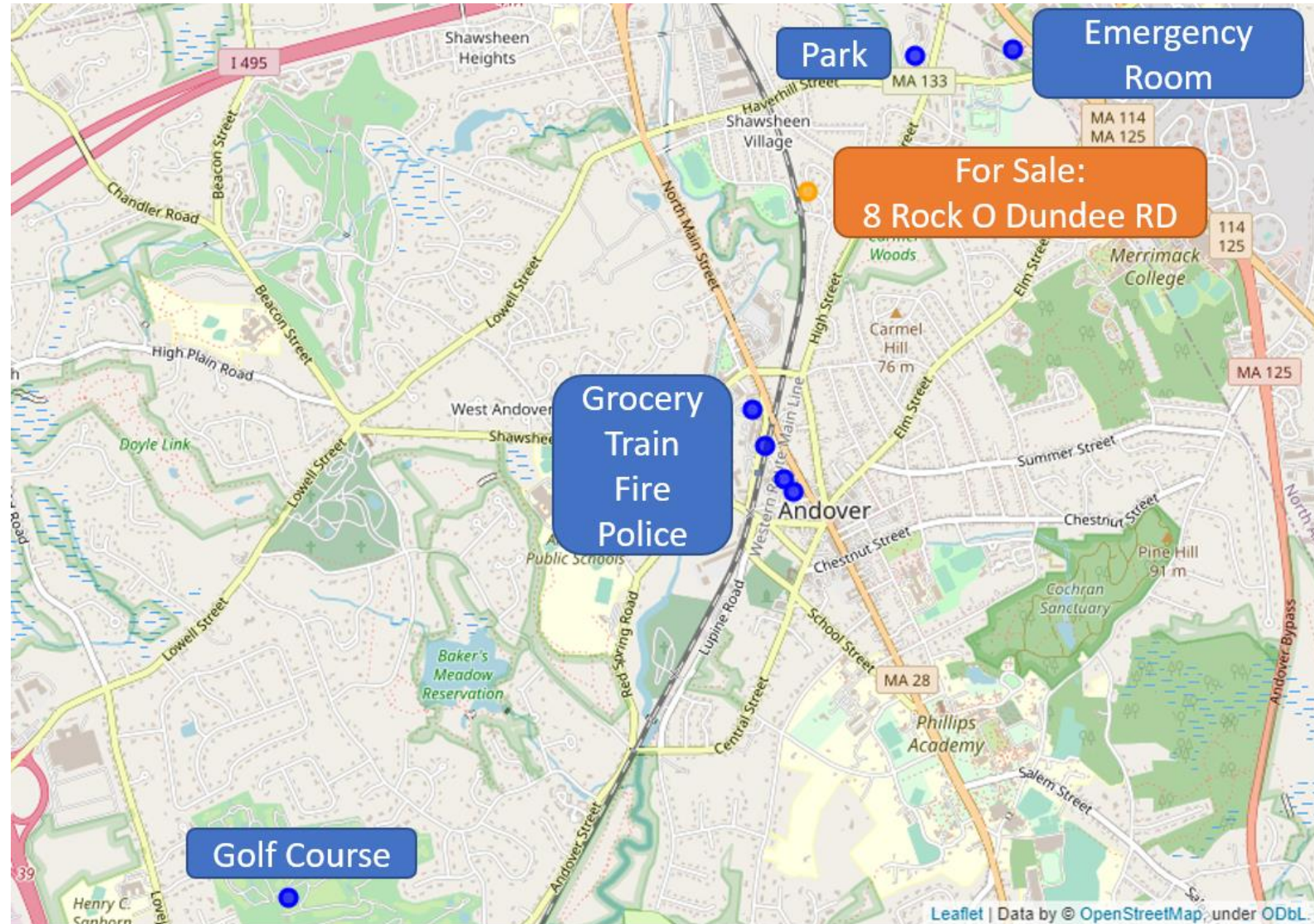
Explore Individual Properties

- Jupyter Notebook is coded to allow each house to be viewed individually. This is an example of the results for 8 Rock O Dundee Rd:

	Address	City	Venue_Name	Latitude	Longitude	Miles_Away	Type	Category_ID
231	8 Rock O Dundee Rd	Andover	Doctors Park	42.675334	-71.135925	0.5	Park	4bf58dd8d48988d163941735
232	8 Rock O Dundee Rd	Andover	Whole Foods Market	42.661179	-71.144769	0.6	Grocery Store	4bf58dd8d48988d118951735
233	8 Rock O Dundee Rd	Andover	Indian Ridge Country Club	42.641669	-71.170020	2.4	Golf Course	4bf58dd8d48988d1e6941735
234	8 Rock O Dundee Rd	Andover	AFC Urgent Care North Andover	42.675541	-71.130661	0.7	Emergency Room	4bf58dd8d48988d194941735
235	8 Rock O Dundee Rd	Andover	Central Station	42.658373	-71.143096	0.8	Fire Station	4bf58dd8d48988d12c941735
236	8 Rock O Dundee Rd	Andover	Andover Police Dept	42.657890	-71.142580	0.8	Police Station	4bf58dd8d48988d12e941735
237	8 Rock O Dundee Rd	Andover	MBTA Andover Station	42.659738	-71.144101	0.7	Train Station	4bf58dd8d48988d129951735

	ADDRESS	CITY	STATE	ZIP	PRICE	BEDS	BATHS	LATITUDE	LONGITUDE
0	8 Rock O Dundee Rd	Andover	MA	1810	649000	3	1.5	42.669856	-71.141811

Explore Individual Properties

- Neighborhood of:
  - 8 Rock O Dundee Rd

Discussion

- Difficulties encountered:
  - Redfin API not officially supported
  - Foursquare API:
    - Has some venues miscategorized
    - Query limit on free unverified version is only 950 per day
- Suggestions:
  - Final deliverable to view neighborhood maps is within Jupyter Notebook which does not make it easily accessible. Suggest putting it in a more user friendly dashboard such as on Tableau Public.

Conclusion

- This project was able to achieve its goal of cutting down on the arduous search process and reducing the number of houses to explore in this example from 39 down to only 8.

- Of that 8 houses that need to be explored further, the neighborhoods are all mapped out with the required amenities for easy comparison.

- This will significantly reduce the burden for our clients in their search for suitable homes.